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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,299	02/20/2002	Ying Liu		3371

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Ying Liu, Ph.D.
1020 PineNeedle Dr.
Savannah, GA 31410

EXAMINER	
ROSARIO, DENNIS	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.**	**Applicant(s)**	
	10/078,299	LIU, YING	
	Examiner	**Art Unit**	
	Dennis Rosario	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _2/26/09 4/7/09_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _50-55_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _50-55_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _28 December 2007_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/26/09 of the RCE and claims of 4/7/09 has been entered. Claims 50-55 are pending.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 50-55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 50 has “ABM” which does not clearly claim anything. The examiner has concluded that ABM is an algorithm for examination purposes.

Claim 53 is rejected for similar reasons as claim 50.

The examiner suggests changing “ABM” to “ABM algorithm” or “algorithm” or to what the ABM is if not an algorithm. In addition, the specification states that ABM is Attrasoft Boltzmann machine. Thus, the examiner suggests changing “ABM” to “Attrasoft Boltzmann machine” which appears to be an algorithm and not a tangible machine such as a computer.

Thus, dependent claims 51,52,54 and 55 are rejected for depending on respective claims 50 and 53.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 50,52 and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Vivarelli et al. (USING BAYESIAN NEURAL NETWORKS TO CLASSIFY SEGMENTED IMAGES).

Regarding claim 50, Vivarelli discloses a process for recognizing a digital image using a computer, said image comprising:

a) imposing an image (see title) to an ABM (or “neural networks trained with…Markov” in the abstract) so the ABM (said networks) will be trained (as stated), whereas the ABM (said networks) is a specific combination (as stated “with” suggests) of

(a) a fully connected neural network (as shown in fig. 1 that includes an input connected to “all”, on page 269, right column, 1st full paragraph, 1st sentence, other units) and

(b) a Markov chain (“Markov chain” on page 270, right column, 3rd paragraph from the bottom);

b) classifying (see title) at least one target image (see title) based on the invariant distribution function (or “equilibrium distribution" on page 270, right column 3rd paragraph from bottom) of the trained (“trained” in the abstract) ABM (said networks).

Regarding claim 52, Vivarelli discloses the process of Claim 50, wherein the step of Classifying at least one target image based on the invariant distribution function of the trained ABM comprises:

a) imposing (via equation (4) on page 270) an image (represented as "D" in equations 1-5 on pages 269 and 270 of training data) to be classified (the results of which are in TABLE 1:Training set on page 269) on an ABM Markov chain (since said chain has the equilibrium distribution at said D) ;

b) allowing the ABM Markov chain to settle on its invariant distribution (by "let[ting] the simulation reach the equilibrium" on page 271, left column, last paragraph), described by a distribution function (said equilibrium distribution);

c) classifying (via said equation (3)) the target image (see title) based on this invariant distribution function (represented in equation (4) in "comput[ed]", on page 270, right column, 3rd from last paragraph, form via the method of "The Markov Chain Monte Carlo method" section starting on page 270,), said distribution (said equilibrium distribution) comprising of information of classes (since the equilibrium is used for solving equations (3) and (4) where equation (4) performs "classification" on page 270, left column, 1st sentence that implies the claimed classes) entered in Claim 36 (b) (claimed 36 was canceled) and weight (or "density" on page 270, right column, 3rd paragraph from bottom) given by the invariant distribution function (said equilibrium distribution "is", on page 270, right column, 3rd from bottom paragraph, the density) directly (as said "is" implies);

d) presenting the results (in TABLE 2 on page 272) as a triplet (image, classification, weight) (since TABLE 2 represents an image set, classification and classification accuracy), which can be used both in image search ("searching" on page 268:Introduction, 1st paragraph) and image classification (as already done in TABLE 2).

Claim 53 is rejected the same as claim 50. Thus, argument similar to that presented above for claim 50 is equally applicable to claim 53.

Allowable Subject Matter

6. Claims 51, 54 and 55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

Claim 51 is allowable because the prior art does not teach all of claim 51.

Claims 54 and 55 are allowable for the same reason as claim 51.

The examiner invites applicant to discuss claims 51,54 and 55 for amending in terms of formalities.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lampinen et al. (Bayesian approach for neural networks-review and case studies) is pertinent as teaching a method of combining Markov with neural nets.

Cho (Neural-Network Classifiers for Recognizing Totally Unconstrained Handwritten Numerals) is pertinent for the same reasons as Lampinen.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dennis Rosario whose telephone number is (571) 272-7397. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Dennis Rosario/
Examiner, Art Unit 2624

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

51. (new) The process of Claim 50, wherein the step of Imposing an image to an ABM comprises:

a) deleting existing ABM connections;

b) creating an input vector, p, based on an input image, x, and its classification, y;

c) breaking the input vector, p, into a number of pieces, pl, p2, p3..., where such breaking

could either be logical (such as based on objects/segments) or geometrically (such as a division of 10 equal parts);

d) constructing a set of neural state vectors, s l, s2, s3 ... according to p l, p2, p3..., whereas a state vector, sl, has a number of O's (grounded state) and a number of l's (excited state); all such vectors together form a configuration space, H(P);

e) computing an initial neural connection from each of pl, p2, p3 ....

said computation

comprising:

el) constructing a connection space, H(C), where each neural connection is a point inside this space; e2) making the connection space, H(C), from a configuration space, H(C) = (H(P), R), where R is a space of real numbers; e3) making an initial connection cl to be cl = (pl, 1), or f(pl) = 1, where f(pl) is a connection matrix element;

f) computing the rest of the neural connections from each of the initial connections, el, c2, c3..., said computation comprising:

fl) constructing a distance or distances, d (pl, pl'), between an initial neural state, pl, and an arbitrary state, pl', said distances can be Hausdorff distance, and/or L I distance, and/or L2 distance, and/or any other distances; f2) constructing a function, g(d), which maps a distance between two neural vectors, d, to a number, g(d), said function comprising of any functions as long as it decreases in value when the distance increases, for example, g(d) = I / (! + d)org(d)=1/(1 +d+d*d);

t3) constructing an arbitrary connection element (pl ', g (d (pl, pl '))) from the initial connection element; f4) applying (pl ', g (d (pl, pl '))) for all points in the connection space since the ABM is a fully connected network with all possible ranks.

g) constructing an ABM Markov chain after all of the connections are established.

52. (new) The process of Claim 50, wherein the step of Classifying at least one target image based on the invariant distribution function of the trained ABM comprises:

a) imposing an image to be classified on an ABM Markov chain;

b) allowing the ABM Markov chain to settle on its invariant distribution, described by a distribution function;

c) classifying the target image based on this invariant distribution function, said distribution comprising of information of classes entered in Claim 36 (b) and weight given by the invariant distribution function directly;

d) presenting the results as a triplet (image, classification, weight), which can be used both

in image search and image classification.

53. (new) A process for recognizing a digital image using a computer, said image comprising:

Imposing an image to an APN so the APN will be trained, whereas the APN is a specific combination of (a) a fully connected neural network, (b) a Markov chain, and (c) a mapping function (called the APN function);

Classifying at least one target image based on the invariant distribution function of the trained APN.

54. (new) The process of Claim 53, wherein the step of Imposing an image to an APN comprises:

a) deleting existing APN connections; b) creating an input vector, p, based on an input image, x, and its classification, y;

c) breaking the input vector, p, into a number of pieces, pl, p2, p3..., where such breaking could either be logical (such as based on objects/segments) or geometrically

(such as a division of 10 equal parts);

d) constructing a set of neural state vectors, sl, s2, s3 ... according to pl, p2, p3 .... whereas a state vector, sl, has a number of O's (grounded state) and a number of I's (excited state); all such vectors together form a configuration space, H(P);

e) computing an initial neural connection from each of p I, p2, p3..., said computation comprising:

el) constructing a connection space, H(C), where each neural connection is a point inside this space; e2) making the connection space, H(C), from a configuration space, H(C) = (H(P), R), where R is a space of real numbers; e3) making an initial connection cl to be el = (pl, 1), or f(pl) = I, where f(pl) is a connection matrix element;

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f) computing the rest of the neural connections from each of the initial connections, cl, c2, c3 .... said computation comprising:

fl) constructing a distance or distances, d (pl, pl'), between an initial neural state, pl, and an arbitrary state, pl', said distances can be Hausdorff distance, and/or L1 distance, and/or L2 distance, and/or any other distances; f2) constructing a function, g(d), which maps a distance between two neural vectors, d, to a number, g(d), said function comprising of any functions as long as it decreases in value when the distance increases, for example, g(d) = 1 / (1 + d) org(d)= 1/(1 +d+d* d); f3) constructing an arbitrary connection element (pl ', g (d (pl, pl '))) from the initial connection element; f4) applying (pl ', g (d (pl, pl '))) for all points in the connection space since the APN is

a fully connected network with all possible ranks;

g) constructing an APN Markov chain after all of the connections are established;

h) constructing an initial mapping to reflect the contribution of the multi-valued neurons, said mapping consists of pairs: (neuron position, input vector value);

i) constructing the rest of the mappings based on the initial mapping, said mapping consists

of pairs: (neuron position, input vector value in the initial mapping).

55. (new) The process of Claim 53, wherein the step of Classifying at least one target image based on the invariant distribution function of the trained APN comprises:

a) imposing an image to be classified on an APN Markov chain;

b) allowing the APN Markov chain to settle on its invariant distribution, described by a distribution function;

c) classifying the target image based on this invariant distribution function, said distribution comprising of information of classes entered in Claim 37 (b) and weight given by the invariant distribution function directly; d) constructing intermediate results as a triplet (image, classification, weight); e) computing a new weight, said computation comprising:

el) constructing a distance between two mappings, the mapping associated with the image to be classified and the mapping associated with the connection created in Claim 36 (g), (h); e2) constructing a function (called the APN function): weight' = h (weight, d), said function comprising of any functions as long as it decreases in value when the distance increases; e3) modifying the old weight by this function;

f) constructing results as a triplet (image, classification, weight'), which can be used both

in

image search and image classification.